

REMARKS*Claims Rejection under 35 USC § 103*

Claims 1-20 were rejected under 35 U.S.C. § 103(a) as unpatentable over United States Patent No. 6,367,593, issued to Siler et al. in 2002.

Siler et al. discloses a ball screw assembly that includes a ball screw 54 and a carrier 42 formed of discrete elements. This separate carrier facilitates manufacture by providing ready access for mounting gears 48 prior to assembly within the ball screw. Also, the separate carrier provides a degree of freedom along the axis during operation of the caliper. Thus, the carrier is allowed to move axially during rotation of the ball screw to maintain the desired gear arrangement. In contrast, in accordance with the present invention, the ball screw is formed of one piece, with the endwall integral to the sidewall. The practitioner would readily appreciate the added difficulty in installing the gears onto the bottom of a cup, as opposed to a separate element free from the hindrance of the sidewall. Moreover, the integral endwall necessarily moves with the sidewall and so is unable to compensate for relative axial movement that might cause displacement of the gears.

On the other hand, nothing in the Siler et al. patent shows that the clearance required to allow insertion of keys 50 on carrier 42 into keyways 52 in ball screw 54, and the clearance produced when ball screw nut 58 is fully extended relative to ball screw 54 might result in misalignment of the carrier relative to the axis that interferes with smooth

gear operation or may even cause displacement of the carrier from the ball screw. Because the endwall and sidewall are integral in Applicants' invention, misalignment or displacement of the endwall is not possible.

For these reasons, the practitioner is not lead to abandon the apparent advantages of the arrangement of Siler et al. and solve a problem that cannot be envisioned from the reference, by enclosing the end of the ball screw, so as to arrive at the present invention.

In another aspect of the present invention, Siler et al. does not disclose a ball return track formed in the ball screw.

Claim 1 is directed to Applicants' ball screw apparatus that comprises a cup-shaped ball screw wherein the ball screw sidewall and the ball screw endwall are integral portions of the same piece. The claim further recites that the endwall forms a carrier for operatively supporting at least one planetary gear. Siler et al. shows a ball screw without an endwall, and provides a carrier that is a discrete element. There is nothing in Siler et al. to point the practitioner to eliminate the discrete carrier or enclose the end of the ball screw. Thus, Siler et al. does not suggest Applicants' invention in claim 1.

Claims 2-9 are dependent upon claim 1 and so not suggested by Siler et al. for the reasons set forth with regard to that claim. Moreover, the dependent claims recite additional features preferred in the practice of Applicants' invention.

In particular, attention is directed to claim 3, which is dependent upon claims 1 and 2. Claim 3 calls for a ball return track that is part of the ball track formed in the ball

screw, as recited in claim 2. Siler et al. does not provide a ball return track in the ball screw and so does not show this feature of Applicants' invention.

Claim 10 is directed to Applicants' electric caliper apparatus that includes a ball screw apparatus having a sidewall and endwall that are integral, and wherein the endwall forms a carrier for operatively supporting at least one planetary gear, features similar to claim 1. For the reasons above, Siler et al. does not suggest Applicants' apparatus in claim 10, or in claims 11-17 dependent thereon.

Claim 18 is directed to Applicants' electric brake apparatus that includes a ball screw apparatus having the features recited in claim 1, including that the endwall is integral with the sidewall and forms a carrier for at least one planetary gear. For the response above, Siler et al. does not point to the apparatus of Applicants' claim 18 or dependent claims 19 and 20.

Accordingly, it is respectfully requested that the rejection of the claims based upon Siler et al. be reconsidered and withdrawn, and that the claims be allowed.

Conclusion

For the reasons herein, it is believed that the grounds of rejection have been addressed and overcome, and that all claims are in condition for allowance. If further prosecution of the application, the Examiner is urged to contact the undersigned at the phone number provided.

The Commissioner is hereby authorized to charge any fees associated with this communication to Deposit Account No. 50-0831.

Respectfully submitted,



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